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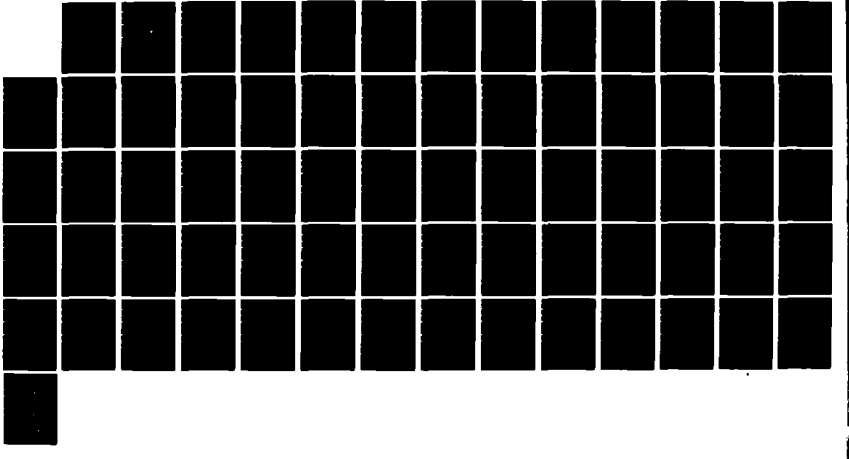

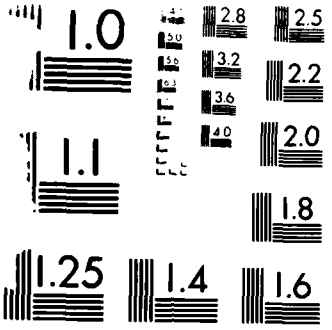

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NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

AN EXAMINATION OF THE FEASIBILITY
OF IDENTIFYING MARINE CORPS RESERVE
DEPOT MAINTENANCE COSTS FOR USE IN BUDGETING

by

Robert E. Foulk

December 1985

Thesis Advisor: J. M. Fremgen

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An Examination of the Feasibility of Identifying Marine Corps Reserve Depot Maintenance Costs for use in Budgeting

by

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Captain, United States Marine Corps
B.S., University of Northern Colorado, 1974

Submitted in partial fulfillment of the requirements for the degree of

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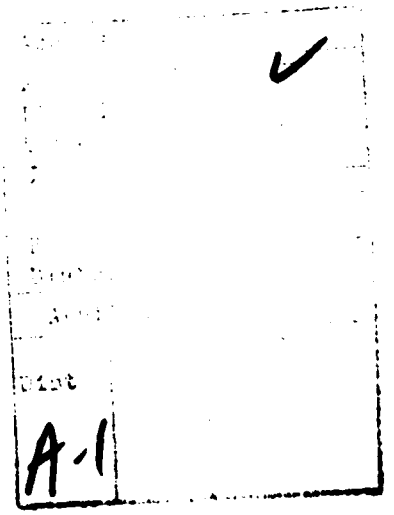
ABSTRACT

The Marine Corps Reserve has the depot maintenance portion of the O&M,MCR appropriation derived by inflating last years budget figure. The appropriation is then billed for depot maintenance on a "fair share" basis, with no system to identify whether the costs of work performed by the depot maintenance activities were actually incurred in work performed on Marine Corps Reserve equipment. The focus of this thesis is the breakdown in the current process of linking costs charged to the Reserve appropriation to actual Reserve generated depot maintenance requirements. Two alternative proposals are presented that allow for a link between actual measures of depot maintenance attributable to the Reserves, and the planning, programming, budgeting, and execution processes. The study recommends a change from the current methods of managing depot maintenance for the Reserves to an alternative method which measures Reserve depot maintenance in terms of equipment issued to Reserve units from the supply system.



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I. INTRODUCTION

A. DISCUSSION OF THE PROBLEM

The Reserve division at Headquarters Marine Corps has the depot maintenance portion of the Operations and Maintenance appropriation derived from a historical figure plus an inflation factor. The appropriation is, subsequently (and somewhat arbitrarily), billed for depot maintenance performed against this amount on a "fair share" basis. There is currently no policy or system to identify costs of work performed at the depot maintenance activities with Marine Corps Reserve equipment. This causes an accountability problem in terms of reconciling what is budgeted with actual charges being funded against the appropriate account. The primary consideration here is whether or not it is feasible for the Reserves, while working under the auspices of a "one Marine Corps" system, to be able to determine their actual share of depot maintenance related funding.

B. THE NEED FOR THE STUDY

For the last few years there has been growing concern whether what is being budgeted for the Reserves for depot maintenance is actually being spent in support of the Reserves. The inability of the current system to supply justifiable answers to this concern not only opens the system to criticism but also puts the Marine Corps in the precarious position of being required by Congress to carry out a program, yet not being able to do it in a justifiable manner.

C. PURPOSE AND SCOPE OF THE STUDY

The area of this research is the portion of the Operations and Maintenance, Marine Corps Reserve appropriation related to depot maintenance. Specifically, the objective was to study the feasibility of identifying Marine Corps Reserve depot maintenance costs for use in the development of the POM and the budget. The study will be strictly limited to the Operations and Maintenance, Marine Corps and the Operations and Maintenance, Marine Corps Reserve appropriations. It will include an analysis of the activity of the organizations of the Inventory Control Point at the Marine Corps Logistics Base, Albany, Georgia; the office of maintenance management at Installations and Logistics, Headquarters Marine Corps (further referred to as LMM-3); and the Repair Division of the Marine Corps Logistics Base, Albany, Georgia (further referred to as the DMA).

D. RESEARCH METHODS

The bulk of the research for this study involved performing on-site interviews with key personnel from the agencies mentioned in the previous section. Additionally, technical information about the planning, programming, budgeting, and execution phases within the Marine Corps was extracted from the Navy Comptroller's Manual, Volumes II and VII. Background on Management principles in nonprofit organizations was derived from the Robert N. Anthony and Regina E. Herzlinger book, Management Control in Non-profit Organizations. Other information specific to certain areas of the study was obtained from Marine Corps Orders, local standing operating procedures, and follow-up telephone calls to the persons interviewed.

The intent was to establish a set of principles that allows for sound management of the depot maintenance process. Then, the current practices were compared with these developed principles in order to determine whether or

not they were in compliance. Finally, two alternatives were developed to enhance compliance with the principles of a good management process; and benefits and costs were assessed for each alternative.

E. EVALUATION CRITERIA

The evaluation of the proposed alternatives was viewed in terms of relevant costs to perform the functions necessary to change from the current system of managing depot maintenance for the Reserves relative to the benefits of each of the alternatives. No benefits in terms of force readiness could be found. The benefits central to the final recommendation, then, are the degree of precision needed to measure Reserve related depot maintenance requirements and the degree of flexibility needed to ensure that essential maintenance work will be accomplished. The final consideration between precision and flexibility centers around the characteristic of credibility--the value of having Fiscal Division, HQMC and, ultimately, Congress believe that the figures that appear in the budget for depot maintenance are justifiable.

F. THESIS ORGANIZATION

The thesis begins with a general background to introduce the various organizations involved in the depot maintenance process and their interactions within the scope of the supply system. It then develops a model of what a good management control process should be like. This model is, subsequently, used as a standard to compare the current process and proposed processes in order to provide the basis for determining the merits of each. In describing each process, costs and benefits are derived and the conclusions and recommendations are based on comparisons of those costs and benefits.

II. BACKGROUND

A. DEPOT MAINTENANCE

The Marine Corps Supply System, which by authorization of the Secretary of the Navy is separate and distinct from the Navy Supply System, is controlled by the Commandant of the Marine Corps. The mission of the Marine Corps Supply System is to provide and manage those items necessary for equipping, maintaining, and operating Fleet Marine Forces, supporting establishments, and the Marine Corps Reserve. This supply system makes the Marine Corps essentially self-sustaining in logistics operations and is structured to the needs of the worldwide operating and supporting forces. It is characterized by centralized management and stock control, decentralized distribution points, and maximum use of automatic data processing.

The Deputy Chief of Staff for Installations and Logistics(I&L), the principal logistician on the general staff of the Commandant, is responsible for logistics plans and policies, material program objectives, and programs relating to material readiness. Within I&L, HQMC, code LMM-3 (further referred to as LMM-3) are the functional managers for all aspects of depot level maintenance for assets managed under the Marine Corps Unified Material Management System. This concept has consolidated all management functions normally associated with military supply into a single integrated system. The organizational structure to satisfy the Marine Corps Unified Management System consists of Marine Corps Headquarters, one inventory control point which is part of the Marine Corps Logistics Base, located at Albany, Georgia, and two distribution centers (see Figure 2.1). The two distribution centers are at the Albany Marine Corps Logistics Base, Georgia and the Marine Corps Logistics Base, Barstow, California. The

Marine Corps Logistics Base at Albany provides logistic support for Fleet Marine Forces (including Reserve) in the eastern United States and the Atlantic theater. The Marine Corps Logistics Base at Barstow provides logistics support for Fleet Marine Force units (including Reserve) in the western United States and the Pacific theater. [Ref. 1]

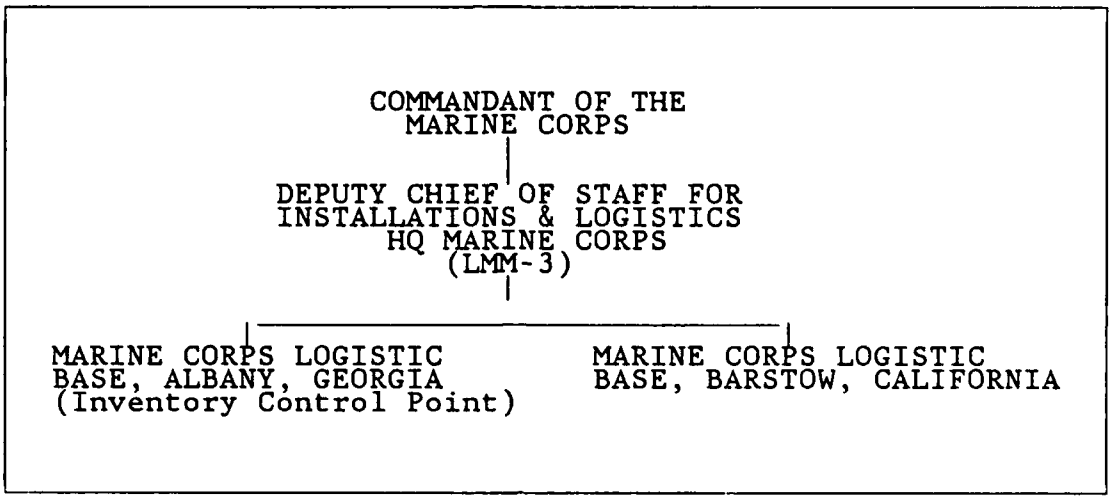

Figure 2.1 Marine Corps Unified Management System.

B. DEPOT MAINTENANCE ACTIVITY

1. Mission

There are two Depot Maintenance Activities (DMA's) in the Marine Corps. They are organizationally designated as the Repair Divisions of the Marine Corps Logistic Bases (MCLB's) Albany, Georgia, and Barstow, California, as depicted in Figure 2.2 [Ref. 2]. However, the DMA's are industrially funded activities and, as such, operate as tenant activities at the two MCLB's. Their relationship is one of customer (MCLB) and service center (DMA).

The mission of the DMA's is to repair, rebuild, and modify all types of Marine Corps ground combat and combat support equipment in support of active Fleet Marine Forces,

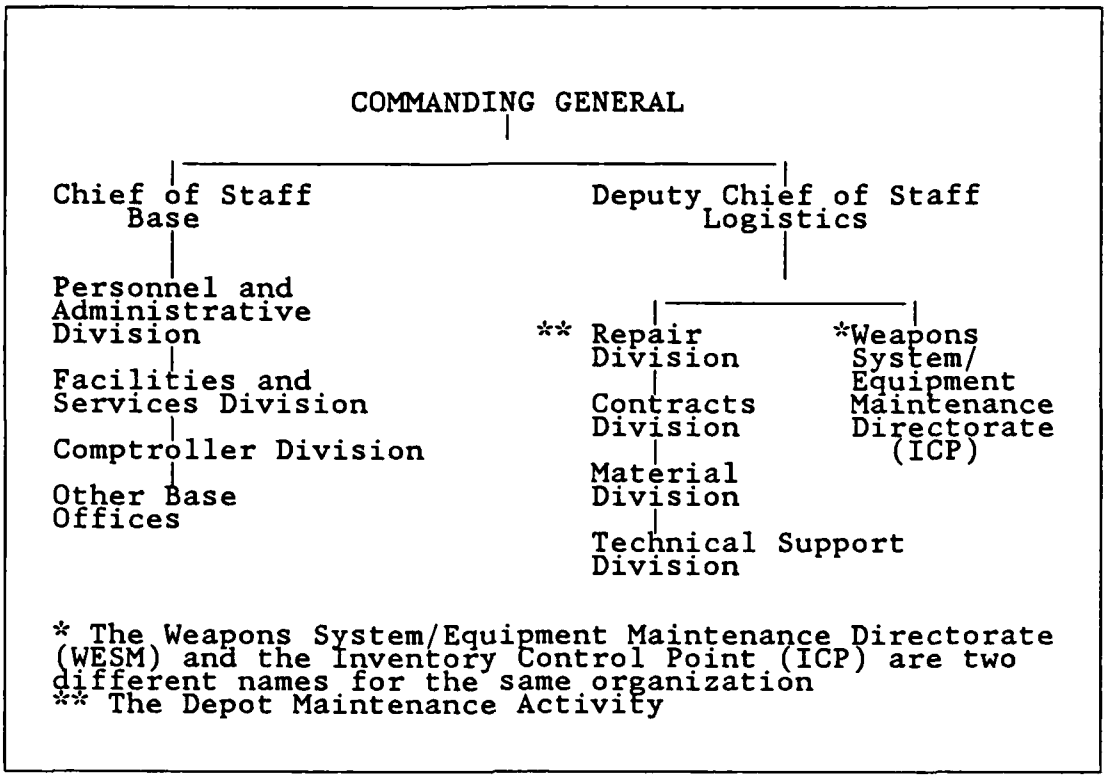

Figure 2.2 The MCLB, Albany.

Marine Corps Reserves, and Posts and Stations. It also includes the care and maintenance of equipment and supplies held in storage at the supply center for later issue to these same forces. Other work associated with the DMA's mission includes preservation, testing, technical evaluation and design, development, and fabrication of equipment for special projects.

2. Organization

For the purpose of clarity, further references to the organization and functions of a depot maintenance activity will be based on the depot maintenance activity at the MCLB Albany, Georgia. This focus permits a detailed description of the DMA's organization and operations. It does not impair the generality of the discussion, however. The DMA at Barstow is not different from the one at Albany in any material way that is pertinent to this thesis.

In order to accomplish the variety of work inherent in it's mission, the DMA is organized into six major branches, as shown in Figure 2.3 [Ref. 2].

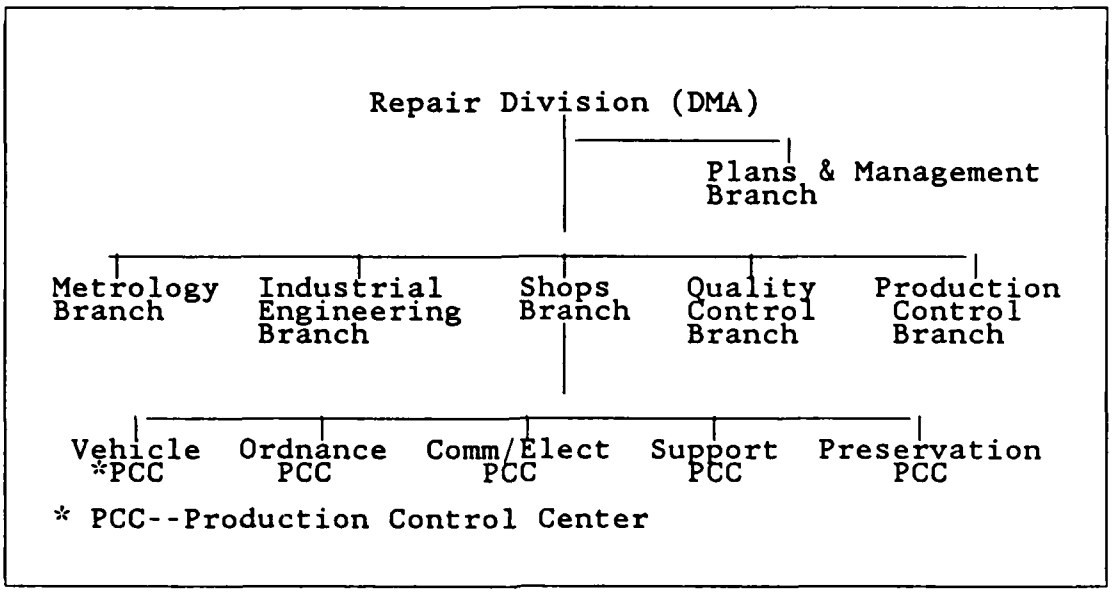

Figure 2.3 Repair Division.

The Metrology and Shops branches are the two operational components, while the other branches provide supporting administrative and control (G&A) services. The task oriented production control centers of the Shops Branch carry out the majority of the DMA's work and are further organized into subunits called cost work centers (CWC's). It is these CWC's that actually contain the personnel who perform the maintenance functions. The CWC's are organized on the shop floor in a job-shop configuration. The operations are performed in the CWC and the equipment is then moved to the next CWC in the rebuild/repair/ modification sequence. Each end item is tagged with an assigned job order number in order that work can be charged to the appropriate job. (In the case of disassembly, each component is additionally tagged.) Charges are then assessed against the

appropriate job order number (JON--initiated by the DMA) by the individual employees manually entering labor hours and material usage into the DMA's central computer at any one of 29 terminals located throughout the shop floor. The key here is that it is the CWC's through which the basic data are captured to show job performance, time, and costs of operations.

The magnitude of work tracked through the DMA's CWC's is such that for Fiscal Year 1985 the master work schedule for the DMA at Albany projects a program cost of over $35,000,000 and will require nearly 930,000 manhours of direct civilian and military labor. These resources will be used in rebuild efforts for over 400 major line items and project orders totaling some 25,000 individual items of equipment. To handle this workload, the DMA had an authorized strength as of 1 October 1984 of seven Marine Corps Officers, 193 Marine enlisted men, 145 graded civilians, and 549 ungraded civilians, for a total authorized strength of 849. [Ref. 3]

3. Interrelationship with other Agencies

For Fiscal Year 1985, the DMA's workload broke down in such a way that 68% of it went toward the 5th echelon (depot level) rebuild program for active FMF and reserve equipment. The rest of it's workload was attributable to the overflow of work from lower echelons of maintenance (3rd and 4th) in the active FMF and Reserves (3%), technical assistance (1%), special projects and new developments (16%), support to other armed services and nations (1%), and care-in-storage (11%) [Ref. 2].

The organization that manages the rebuild and repair of FMF equipment (the majority of the DMA's workload) for the Marine Corps Supply System is the Inventory Control Point (ICP). The ICP is located at the Marine Corps Logistic Base, Albany. It manages the rebuild and repair of equipment within the context of the Replacement and

Evacuation (R&E) Program which allows both active FMF and Reserve units to replace nominated items of equipment in a direct exchange with the supply stores of equipment at the Marine Corps Logistic Bases. The equipment received from the active FMF and Reserve units will then be rebuilt and/or repaired to a serviceable status. In all of this, the ICP must ensure that the stores system maintains an adequate inventory of serviceable assets. In addition to maintaining a pool of serviceable assets to support the R&E Program, the stores system must hold and maintain sufficient serviceable end items to support the mobilization requirements imposed by the Maritime Prepositioning Ships program (MPS 1,2,&3), the Prepositioned War Reserve safety levels, and the initial issue of equipment which is identified in active FMF and Reserve unit's tables of equipment but has not yet been released by the MCLB to these units. Because these are total Marine Corps requirements to support various mobilizations with varying priorities as to who would get what equipment first, the ICP has not been concerned with tracking the identity of the equipment once it is received into the supply stores system. However, this loss of identity is a major dilemma when it comes to determining the cost to support the Reserves portion of depot maintenance to be performed later at the DMA.

The ICP is able to determine what equipment should be turned in to the stores system for the R&E Program. So, with this and an estimate of repair work on component parts, it provides the quantitative rebuild and repair requirements to Headquarters Marine Corps, code LMM-3, which prepares it for inclusion in the Marine Corps Program Objective Memorandum (POM) for submission to DOD and, eventually, Congress. It is during this POM process that the information provided by the ICP to LMM-3 is converted into a Master Work Program which lays out the DMA's workload for the POM year plus the next four years. Ultimately, this

Master Work Program is revised for the budget year and becomes the Master Work Schedule for the DMA for the next fiscal year. Thus, it is the ICP which plays the major role in determining what the DMA's workload will be.

This interaction in the POM process between the ICP and LMM-3 (in addition to the development of the Master Work Program and Master Work Schedule) is key to the development of the depot maintenance portions of the Operations and Maintenance, Marine Corps and Operations and Maintenance, Marine Corps Reserve appropriations. Subsequently, this same interaction is the major determinant of the DMA's projected workload in terms of upcoming requirements for materials and manhours. This directly influences the DMA's Marine Corps Industrial Fund (MCIF) budget. [Ref. 4]

The O&M appropriations are managed by LMM-3. It programs for, budgets for, and has total obligational authority for depot maintenance for the Marine Corps (both Active and Reserve). LMM-3's role as intercessor between the ICP and the DMA is mandated by Congress with the intent of allowing the DMA to operate independently from the MCLB (and the supply system), while being located at the same base and sharing common support functions.

Of importance in the interrelationships among the DMA, the ICP, and LMM-3 at HQMC is the realization that the depot maintenance portion of the O&M Appropriation exists as a means to reimburse work done at the DMA. Additionally, the information that these organizations provide for the purpose of O&M funding is a major determinant of the approved level of industrial funding that the DMA receives.

4. The Marine Corps Industrial Fund

The MCIF provides the revolving or working capital which finances the industrial operations of the DMA on a reimbursable basis. That is, work is authorized by orders citing customers' appropriations that are to be charged for the work. Costs to fulfill these orders are then,

initially, financed by the DMA's own working capital and are, subsequently, billed to these customers' appropriations. Thus, the DMA is reimbursed for it's services. This process of using working capital (cash) to provide the material, labor, and overhead necessary to process end items and secondary repairables (creating a work-in-process) and then using billings to convert the work-in-process back to cash is a continuous one (as illustrated in Figure 2.4). This allows for a fixed corpus of working capital to finance an even larger amount of work because of the continual flow of funds into and out of the activity.

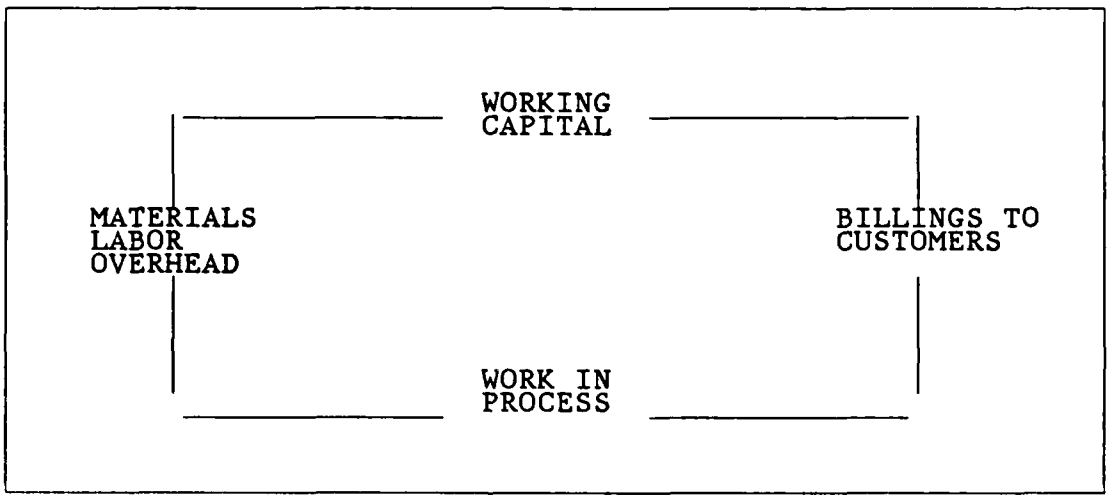

Figure 2.4 MCIF (a revolving fund).

The Marine Corps Industrial Fund budget for the DMA is prepared annually. It is based on the requirements developed in the POM process relative to the estimated levels of depot maintenance scheduled for the DMA. It is then translated by the DMA itself into planned staffing patterns for each G&A and Production Control Center for determination of the MCIF Budget and, as such, is separate from but related to the depot maintenance portion of the O&M Appropriations. For instance, because the DMA executes

customer programs which are financed with appropriated funds, reductions in the factors determining the the amounts programmed for depot level maintenance in the O&M appropriations budgets will result in like reductions in the MCIF Budget. The MCIF Budget, then, reflects anticipated spending of appropriated funds and contributes to the support of appropriation budgets.

The initial corpus of the MCIF is allocated from the Office of the Comptroller of the Navy to the Commandant of the Marine Corps. The Commandant will then, in turn, allocate working capital to the head of each industrially funded activity (the Commanding Generals, MCLB's Albany and Barstow) vesting in them obligational authority to perform depot level maintenance at the DMA. Occasionally, the corpus is augmented by a direct injection of funds from Congressional appropriations in order to compensate for inflationary factors such as pay increases, to expand the fund in response to an increase in the work load requirements at the DMA, or to reflect a status change in the Prepositioned War Reserve. However, the majority of annual funds flow into the MCIF from it's customers. It's largest customer is the Marine Corps Supply system for the rebuild and repair of principal end items of equipment, which work is funded by the portion of the O&M appropriation dealing with depot maintenance. [Ref. 5]

C. APPROPRIATION AND PROGRAM FORMATS

1. General

The Marine Corps budget for depot maintenance is presented in terms of two purposes. It is presented in the appropriation format in terms of resources needed to finance the programs set forth (i.e., inputs or costs). It is also presented in the program format in terms of resource requirements needed to accomplish the projected level of activity inherent in meeting organizational goals (i.e., outputs). When the budget is executed, the actual inputs

(costs) can be compared with the actual outputs (the activities actually accomplished) to be used in measuring organizational efficiency. Additionally, the actual outputs can be compared to programmed activity levels for use in analyzing organizational effectiveness.

The appropriation format provides both the framework for formulating budget requirements and the legal source from which to execute and subsequently account for authorized programs. Within the arena of DOD budgeting, appropriations can be categorized as either Operations and Maintenance, Military Pay, Research, Procurement, or Construction. They can also be divided into smaller accounts according to purpose or budget activities. The budget activities serve to clarify the function of the budget and provide the link to various programs encompassed in each major category. Appropriations make available funds which are authorized by the Congress to be used for special purposes and cannot be expended for other than the purpose stipulated. [Ref. 6]

The program format sets forth what accomplishments can be expected from resources made available over a span of the next five years. This Five Year Defense Plan (FYDP) currently encompasses ten programs which identify broad areas of both mission and support as depicted in Table I .

The building block of the program format is the program element (PE) which is a grouping of forces, manpower, and costs associated with an organization, a group of similar organizations, a function, or a project. PE's can be aggregated within each program [Ref. 7].

2. The O&M,MC Appropriation

The Operations and Maintenance, Marine Corps Appropriation is structured by budget activities which directly reflect four of the ten FYDP programs depicted in Table I . They are--Budget Activity II, General Purpose Forces; Budget Activity VII, Central Supply and Maintenance;

TABLE I

FYDP PROGRAMS

Program 1	Strategic Forces
Program 2	General Purpose Forces
Program 3	Intelligence and Communications
Program 4	Airlift and Sealift
Program 5	Guard and Reserve Forces
Program 6	Research and Development
Program 7	Central Supply and Maintenance
Program 8	Training, Medical, and Other General Personnel Activities
Program 9	Administrative and Associated Activities
Program 10	Support of Other Nations

Budget Activity VIII, Training, Medical, and Other General Personnel; and Budget Activity IX, Administration and Associated Activities. Each budget activity will be divided into program packages which are aggregations from one or more of the 10 FYDP programs.

Of the four budget activities mentioned above, Budget Activity VII, Central Supply and Maintenance is germane to this study because within it exists the program package related to depot maintenance--Program Package, Equipment Maintenance.

Table II shows data extracted from the Department of the Navy Justification of Estimates for Fiscal Year 1986 submitted to Congress in February 1985 for Operations and Maintenance, Marine Corps [Ref. 8]. It provides not only the structure of the O&M,MC appropriation for Budget Activity VII but also a perspective on the size of the O&M,MC appropriation that is specified for depot maintenance under Program Package, Equipment Maintenance.

TABLE II

O&M,MC--BUDGET ACTIVITY VII ($000)

Program Packages:	FY 1984 actual	FY 1985 revised	FY 1986 President's Budget
Supply Depot Operations	$43,749	$44,219	$51,192
Inventory Control Point	50,542	73,112	36,659
Transportation of Things	55,653	103,453	99,920
Other Logistic Support	20,392	24,785	22,632
Commissary Stores Operations	16,501	17,100	16,821
Equipment Maintenance	93,536	121,778	127,444
Stock and Industrial Fund Support		27,356	
Base Operations	50,986	54,434	57,604
Base Communications	3,901	5,405	5,615

3. The O&M,MCR Appropriation

The Operation and Maintenance, Marine Corps Reserve Appropriation (O&M,MCR) is structured into three budget activities, and each is a program package unto itself. These packages are made up of program elements or aggregations of program elements within the Five Year Defense Program--Program V, Guard and Reserve Forces. Table III shows the structure and relative size of the O&M,MCR appropriation as provided in the Department of the Navy Justification of Estimates for Fiscal Year 1986 submitted to Congress in February 1985 for Operations and Maintenance, Marine Crops Reserve [Ref. 8]. Specifically germane to this study is Budget Activity 2, Depot Maintenance.

TABLE III

O&M,MCR--BY BUDGET ACTIVITY ($000)

	FY 1984 actual	FY 1985 revised	FY 1986 President's Budget
BUDGET ACTIVITY 1	$24,640	$29,325	$30,307
BUDGET ACTIVITY 2	1,587	1,665	1,692
BUDGET ACTIVITY 3	25,884	27,852	29,601

4. The Significance of Separate Appropriations

The Navy Comptroller's Manual [Ref. 6] states that the O&M,MC appropriation, Budget Activity VII--Program Package, Equipment Maintenance funds the depot maintenance (major repair and rebuild) of Marine Corps ground equipment (less Marine Corps Reserve equipment). The depot maintenance for the Reserves is to be programmed, budgeted, and accounted for separately within the O&M,MCR appropriation, Budget Activity 2.

This separation of Reserve accounts from active duty accounts is a result of a special DOD Appropriation Act passed by Congress in 1973. It requires all services to create separate O&M accounts for their Reserve Forces. This requirement derived from Congressional concern as to why active duty forces were seen to be modernizing while Reserve Forces were being structured with older "hand-me-down" equipment, much of which was in disrepair [Ref. 9]. Thus, by law, the Marine Corps must match costs to perform depot level maintenance with the correct source (active or reserve unit) in order to account properly for work charged to each one's own program package for depot maintenance. However, under current practices there is no way to match costs of performing maintenance to either Active or Reserve units.

Current practices have the DMA accepting and performing work in support of the supply system, and, as mentioned earlier, the supply system (specifically the ICP

inventory managers) does not record the identity of equipment received into the equipment stores system. Because of this, the requirements that LMM-3 receives from the ICP to fund work at the DMA contain no reference as to what portion of the work is attributable to Reserve equipment. Therefore, what the DMA actually receives is a "batch" of equipment to be rebuilt and/or repaired for one customer (the supply system). Even though the DMA has the ability to capture direct costs associated with the work they perform, the work will be charged to one appropriation (either the O&M,MC appropriation or the O&M,MCR appropriation) but never a combination of the two because there is no methodology for distinguishing how to allocate costs between Active and Reserve equipment.

The result is a completely arbitrary system of separating Reserve appropriations from Active Marine Corps appropriations relative to depot level maintenance, with no direct link to actual costs to rebuild, repair, and/or modify each one's equipment.

D. THE PRINCIPLES OF A GOOD MANAGEMENT PROCESS

1. General

This section addresses the process by which management can plan organize, direct, and control the funding and execution of depot level maintenance efforts within an organization. Subsequent chapters analyze the current practices of LMM-3, the ICP, and the DMA in the management of the planning, programming, budgeting, and execution of depot level maintenance in terms of the principles presented in this chapter.

2. The Control Process

The principal steps in a formally controlled system are 1) some degree of high level planning , 2) programming, which translates plans into time-phased activities, 3) budgeting, which further projects these programs in terms of realistic requirements for a specific year (subject to total

resource constraints), and 4) operating, measuring and reporting performance of the plan. Each of these steps should lead to the next, recur in a regular cycle, and together constitute a "closed loop" system. The information in the system consists of estimated or actual data relative to measurements of outputs (e.g., force readiness levels, unit training accomplishments,or, in terms of depot maintenance, quantities of equipment rebuilt, repaired, and/or modified) and inputs (usually expressed as costs). Prior to actual operations, decisions and estimates are made as to what outputs and inputs are to be; during actual operations, records are maintained as to what outputs and inputs actually are; and subsequent to operations, reports are prepared that compare actual outputs and inputs to estimated outputs and inputs, and action is taken on the basis of these reports. [Ref. 10:p. 14]

3. Planning

Planning is defined as the process of deciding on the goals of the organization and on the broad strategies that are to be used in attaining these goals [Ref. 10:p. 2]. Strategy defines the direction of an organization. It identifies overall goals and often influences objective priorities. However, strategy will almost always acknowledge the realities of broad constraints in an endeavor to subscribe to attainable goals. In other words, get the most in the way of resources and do as much as possible with them. However, where the available resources cannot produce the desired outcomes, the definition of goals becomes much more complicated. This forces prioritization and a degree of compromise between the choice of goals and the resources available. To this extent, what is called the plan and what is called the program is sometimes hard to separate. Conceptually, planning encompasses setting goals and strategies for achieving these goals, while programming takes these goals and strategies as given and seeks to identify

functions, projects, or activities that will implement them. In practice, however, there will be considerable overlap in that the programming process may identify the desirability of changing goals or strategies, while planning might include some consideration of the programs that will be adopted to achieve goals.

An important reason for making a separation in practice between programming and planning is that the programming process tends to become institutionalized and thus tends to put a damper on creative activities. A separate planning activity can provide an offset to this tendency. Planning should be the beginning of a process which starts off relatively pure at the highest levels and, as it filters down the organization, will become more and more constrained by the realities of scarce resources so that it will eventually take on the form of guidance for the development of specific activities or functions [Ref. 10:p. 278].

4. Programming

The programming phase of a control process is not a distinctly separate endeavor. Instead, it follows from the planning phase and involves making decisions about the specific means of achieving the goals and strategies previously set forth. These goals and strategies should be translated into specific programs according to functions, organizations, projects, or similar groupings consistent with the ways in which the resources will be used. This sets a structure of programs capable of aggregating data in such a way that will be useful to different levels of managers (top level, program manager level, and operational manager level). Ideally, then, these program structures will be time-phased in terms of projected outputs (e.g. accomplishments, postures, or states of readiness). This is presented in terms of the full costs of carrying out programs in future years. The end result is a statement, in financial terms, of the organization's capability to meet

its plans and goals. It is presented in programs capable of aggregating data in a way which facilitates future decisions and comparisons by managers relative to resources allocated to programs and fees charged to customers for the reimbursement of costs incurred in executing the programs. [Ref. 10: p. 7]

5. Budgeting

While planning and programming tend to emanate primarily from the top of the organization down and feature full costs of carrying out programs into future years, budgeting is tied to the operating levels (responsibility centers) that are responsible for controlling and measuring the inputs of labor, materials, and services necessary to carry out the proposed programs during the next year. A budget is a financial plan which states realistic figures relative to the next year's resources required to meet organizational objectives as laid out in the planning and programming phases. Additionally, budgeting provides a tool to monitor the organization's financial activity during this same time frame [Ref. 10:p. 79]. To do this, it must be able to relate budget activities to programs. The common link between the two must be the basic building blocks which state what resources were used, for what purposes, for whom, and by whom. These building blocks (the program elements) must be capable of being aggregated for measuring program effectiveness, as well as operational efficiency.

As with programming, the budget process incorporates two-way communications. Guidance flows through the organization from planners, and operating managers should in turn formulate their budgets consistent with these guidelines. In concert with this, however, operating managers should be free to negotiate trade-offs among proposed programs so as to implement those programs (old or new) that are most

beneficial to the organization's ultimate goals. This two-way process helps to ensure that all levels of the organization are committed to accomplishing the planned program.

6. Operating, Measuring, and Reporting

During the period of actual operations, records need to be kept of resources actually consumed and outputs actually achieved. The records of resources consumed (i.e., costs) are structured so that costs are collected both by program and by responsibility centers. As mentioned earlier, planners and programmers are concerned with a system of capturing costs relative to programs (i.e., functions, organizations, and projects). Operating managers in responsibility centers need a system of data collection for use in planning, coordinating, and controlling the activities of their respective responsibility centers. Costs captured under the program structure are subsequently used as a basis for future programming, while costs captured under the responsibility center structure are used to measure the performance of the responsibility centers and their managers.

In order to have an articulated system, the program cost accounts should be related to the responsibility center cost accounts. Because the program structure lays out projected resources for specific programs relative to functions, organizations, or projects, the responsibility center account structure should likewise identify 1) who is using the resources and for what purposes, 2) whether or not the funds are being used in the manner in which they were budgeted, 3) what functions were being performed when the resources were used , and 4) what kind of resources were used [Ref. 11].

Reporting and analysis completes the process and closes the loop on the control system by bringing back to those responsible managers information which can be used to

compare actual performance with planned performance. These reports should be used by managers to stay abreast of current activities. Additionally, they should be used to evaluate operations of the activity as well as the activity managers. Finally, the reports can be used as a tool for program evaluation and may lead to program revisions if optimal results are not being achieved otherwise.

III. THE DEPOT MAINTENANCE PROCESS

A. PLANNING

In the preceding chapter, it was established that planning is a process of deciding on organizational goals and the broad strategies to be used in attaining these goals. Strategies related to force modernization, readiness, and mobilization affect depot maintenance in terms of increased costs to repair, rebuild, and/or modify new equipment; in terms of increased maintenance costs resulting from greater amounts of equipment introduced into the system; and in terms of increased demand to provide for more equipment to be serviceable at one time.

There are three strategic programs that impact on depot maintenance: 1) the Near Time Prepositioning Force (NTPF) Program, 2) the Maritime Prepositioning Ships (MPS) Program, and 3) the War Reserve Program. The War Reserve Program ensures that an acceptable level of material and equipment is available to the Fleet Marine Forces and Reserves during both mobilization and combat operations. The asset posture needed to support this program is identified by CMC in it's Initial Guidance and Programming Plan and includes not only unit tables of equipment levels, but also supply stores stock levels adequate to assure timely support of specific forces until replenishment can be effected [Ref. 12]. The NTPF Program is an interim program directed at the attainment of maritime prepositioning for possible contingency use. The majority of equipment for the NTPF Program was acquired from Prepositioned War Reserve Materials Stocks of the War Reserve Program. The draw down was significant, putting a strain on the Supply Stores System in terms of available assets to support on-going maintenance programs. Currently, the Marine Corps is replacing it's NTPF requirements by realigning assets to support the MPS Program. The

MPS Program will deploy equipment to support three separate brigades on ships (MPS-1, MPS-2, and MPS-3). This program surpasses the NTPF Program because the ships can be moved to potential trouble spots and offloaded to provide greater readiness and mobilization. Also, the MPS Program is different from the NTPF Program in that the equipment to support the MPS Program is to be purchased through acquisition programs and not drawn from present organizational assets [Ref. 16].

In any case, these strategic programs will affect the total types of, amounts of, and priorities of repair for equipment needed in the Marine Corps inventory. These needs, in turn, influence major procurement programs and/or modification programs, both of which have an impact on future requirements for depot maintenance. Additionally, policies addressing force readiness in terms of unit training will have a direct effect on depot maintenance requirements. That is, as unit training levels increase, so too will the amount of equipment usage and ,likewise, maintenance requirements.

B. PROGRAMMING

In support of strategies such as force modernization, readiness, and mobilization, which require an influx of equipment into the supply system, programmers must analyze certain factors to determine whether to purchase new equipment or rebuild, repair, and/or modify existing equipment. In this regard, inventory managers at the ICP derive information that reflects whether assets will be available to service the projected requirements (i.e., Replacement and Evacuation--R&E program, War Reserve Program, and supply stores stock--equipment ready for issue). When it is found that requirements exceed assets, a potential buy situation exists. The decision to buy new or to upgrade old equipment will be based on an analysis of the expected useful life of the equipment, the mean time between major rebuild

requirements, and the effects of increased technology on maintenance costs over the life of the equipment. The result of these efforts is complimentary acquisition and modification programs developed by acquisition project officers (APO's) to meet strategic requirements.

LMM-3 (which is responsible for aggregating data into the program format, for preparing the budget, and for obligating funds for depot level maintenance) will be the recipient of the efforts of the ICP and the APOs. LMM-3 will derive the depot maintenance portions of the FYDP programs 5 and 7--Guard and Reserve Forces and Central Supply and Maintenance. Each of these programs will consist of program elements expressed as line items for equipment maintenance. The program elements are principal end items (PEI's), secondary repairables (SDR's), and modifications (MOD's). The program element for PEI's reflects the cost to perform depot level rebuild and repair work on principal end items of Marine Corps equipment (trucks, tanks, howitzers, etc.). The data for this are derived from a projected turn-in schedule based on usage (usually time or miles). The program element for SDR's reflects the cost to perform depot level rebuild and repair of components of end items (engines, transmissions, etc.). These data are derived from historical data to project repair cycles. The data for the program element MOD's will be derived by the APO's and provided to LMM-3 as a dollar figure to be included in the POM submission. The data reflect the direct costs for work to be performed by the DMA for the proposed modification programs [Ref. 4].

Both the PEI's and SDR's will be derived at the ICP as part of the Marine Corps Depot Level Maintenance Program (DLMP). The DLMP is developed as a method of determining quantitative rebuild and repair requirements from which data will be developed for inclusion in the POM for submission to DOD and Congress [Ref. 13].

1. The ICP, Depot Level Maintenance Program

a. Principal End Items

One aspect of the DLMP will be to forecast the amounts of PEI's that will meet the requirements (miles, hours, or years of usage) for depot level rebuild for the next five years for the entire Marine Corps. In addition to projecting the amounts, the DLMP will assign a point value indicating each item's rebuild priority. This is based on the type of unit (Active, Reserve, Cadre, I&I) and mobilization factors. The methodology involves comparing serviceable and then the unserviceable assets (for Active and Reserve separately) projected to be available with the table of equipment (TE) and table of equipment for training (TA) for the Active and Reserves, respectively. This identifies unserviceable items on-hand at the beginning of the fiscal year and unserviceable items that will be generated during the year. The two figures are summed and the process repeated to project the total rebuild and repair requirements for the next five years [Ref. 13]. These projections are tied very closely to the R&E program because the repair program for PEI's is the primary source of serviceable equipment for the the supply stores stock (equipment ready for issue), which is the pool of assets used to support the R&E program. Of significance in this process is that Reserve assets and requirements will be computed separately by identifying Reserve command designators.

b. Secondary Repairables

The secondary repairable (SDR) DLMP requirements will lead to the projected amounts of component items (engines, transmissions, etc.) requiring depot level repair at the DMA for the next five years. The methodology is much the same as that for deriving PEI requirements. The data are obtained from the DMA and/or commercial activities in terms of repair cycle requirements, repair cycle times, projected shortages, and back orders to determine SDR

requirements. The data are compared with projections of unserviceable assets in order to develop a repair schedule for the outyears. Of significance here is the fact that the data for SDR requirements lack any identity to either Active or Reserve unit's equipment--it is total force repair requirements. Therefore, in order to determine separate Reserve SDR requirements, the ICP (via the Comptroller) tracks what has been sent to Reserve units and derives an average annual dollar amount to project for Reserve SDR repairs. Where data for a specific item are not available, the ICP merely estimates the cost to repair an item as approximately equal to 60% of it's purchase price. [Ref. 4]

2. LMM-3, POM Input

As functional manager for depot equipment maintenance, LMM-3 is responsible for preparing the data received from the ICP regarding PEI's and SDR's and from the acquisition project officers regarding modification for submission into the Marine Corps POM.

The data that the ICP provides in the DLMP for PEI's are stated is terms of number and type of end items. LMM-3 will review this to ensure that the items projected are valid--that is, that they are in the inventory. New items need to be phased in and old items need to be phased out accurately in the outyears. Also, LMM-3 will check to ensure that items do not appear as PEI's when they should be repaired as SDR's. LMM-3 will, additionally, check the priorities associated with the PEI's to ensure conformation with CMC guidance. LMM-3, after validating the requirements, will price them by using last year's actual maintenance costs as the base. In concert with applying these base costs to repair the PEIs, LMM-3 also applies escalation factors to adjust the resultant program costs. These escalation factors are provided by CMC and include not only cost growth associated with inflation but also real cost growth, which is growth caused by supply and demand; by changes in

design, quantity and schedule; and by estimating and factor changes [Ref. 14].

The SDR data come to LMM-3 as a dollar figure from the ICP. The ICP has been delegated (by LMM-3) the total responsibility to manage all aspects of SDR's. Consequently, LMM-3 merely incorporates the SDR data into the POM format with no detailed review.

The last program element incorporated into the total depot maintenance program is for modifications. MOD data identify funds that are required to install depot level modification kits that either have been purchased or are currently authorized (or budgeted) to be purchased with Marine Corps procurement funds. The data for modification are derived from the core of the Procurement Marine Corps (PMC) appropriation or from initiatives generated by acquisition project officers. Since the total funding requirement for modifications is tied to the PMC appropriation and APO initiatives, it reflects a total force requirement. LMM-3 has no way currently of separating what would be the Reserves share form the Active duty share. Therefore, the modification program element amount is included solely in the depot maintenance portion of the O&M,MC appropriation.

The result of LMM-3's efforts at this stage of the programming process is an accumulation of costs for the POM year plus the next four years broken down into PEI, SDR, and modification program elements. The PEI's and SDR's are designated between Active and Reserve and can thus be incorporated into the appropriate program format. The modification data are all compiled into the O&M,MC program. However, LMM-3 applies a last analysis to the Reserve figures and adjusts them to conform to a traditional pattern by shuffling the projected quantities listed in the DLMP between Active and Reserve to "fit" a historically budgeted trend. This amount is projected as a level amount for the outyears, to be adjusted in each subsequent year. This

process makes the final amount programmed for the O&M,MCR appropriation (program package 2--depot maintenance) an arbitrary figure. LMM-3 merely uses the input from the ICP as a "barometer" of the projected amounts for Reserve depot maintenance. This process is currently used because of the nature of the supply system--that is, the "one Marine Corps" concept. Depot level maintenance of equipment is performed in support of the supply system and not individual units and, as a result, there is no operational need to consider equipment unit identification as being germane once an item enters the supply system. Also, because LMM-3 and the ICP have, together, obligational authority for all depot maintenance (LMM-3 for Mod's and PEI's and the ICP for SDR's), both will ensure that all depot maintenance is accomplished regardless of whether it is charged to the O&M,MC or the O&M,MCR appropriation [Ref. 14].

3. LMM-3, The Master Work Plan

In addition to using the 5 year DLMP as the source of data for the development of the depot maintenance portion of the POM, LMM-3 also converts it into a 5-year work schedule--a master work plan. The master work plan will plan the workload assigned to each DMA, to other services, and to commercial activities for the POM year plus the next four years. The master work plan will be sent to each of the activities listed above, as well as to the ICP. This allows all activities concerned to project long range requirements and provides a base for future programming and budgeting. The master work plan has no reference to whether the equipment scheduled for maintenance is attributable to Active or Reserve units. It merely identifies a type and quantity of equipment on a specific line number, which identifies a programmed level of output and will later be used to schedule and fund depot maintenance.

C. BUDGETING

The budgeting for the depot maintenance portions of the O&M,MC and O&M,MCR appropriations is done by LMM-3. The budget for depot maintenance is an outgrowth of the master work plan. The master work plan, at this point of the process, will have been revised and reformatted several times--each time bringing the projected schedule more into line with current expectations and circumstances. Three months prior to the beginning of the next fiscal year, the current year of the master work plan will be reviewed, converted, and republished as the master work schedule. The result is that the master work schedule identifies revisions to the master work plan for the upcoming year. This process also provides the basis for projecting requirements of the following year (budget year). LMM-3, upon completion of the master work schedule, will send it (or the pertinent portion of it) to the appropriate maintenance activities--the DMA, commercial, or other armed services' depot maintenance activities. This provides these activities an estimated level of output which allows them to plan their workload and gives them a basis for their budget requirements. [Ref. 14]

In the case of the DMA, a conference is held at HQMC with personnel from LMM-3, the ICP, and the DMA attending. At this conference, the workload for the DMA is finalized on the bases of projected requirements, the manhour availability of the DMA and the funds available to support the program [Ref. 2]. Additionally, the master work schedule will be used by the DMA as a tool to compile it's industrial fund budget. The DMA will subsequently price out the work and send the data back to LMM-3 for incorporation into the O&M,MC and O&M,MCR appropriations.

However, since the DMA repairs equipment for the supply stores system stock and because the equipment in the supply stores system stock has no record which identifies it to either active Fleet or Reserve forces, the master work

schedule is a line-by-line schedule of equipment repair for the entire Marine Corps with no distinction between Reserve and Fleet generated requirements. The result is that LMM-3 receives back from the DMA a priced out master work schedule reflecting total Marine Corps figures. At this point the data reflect realistic cost projections for the total Marine Corps maintenance requirements in terms of direct labor, materials, and overhead for incorporation into the budget. However, LMM-3 must again separate Reserve costs from active FMF costs in order to comply with the appropriation structures. This is done by the same methodology used in the programming process of dividing depot maintenance between Active and Reserve forces. The Reserves are given a portion of this total amount corresponding to their last year's share, adjusted for inflation, while the Active forces O&M,MC appropriation gets the rest. The quantities used in justifying these dollar amounts will correspond directly to the separate quantities identified to be incorporated into the Marine Corps POM during the programming phase.

The result of this process is two separate figures for depot maintenance that will be included as part of the O&M,MC and O&M,MCR appropriation budget submissions. One figure will be for the active FMF forces to be incorporated in the O&M,MC appropriation (budget activity VII, central supply and maintenance--program package, equipment maintenance). The other figure is for Reserve forces to be incorporated into budget activity 2, depot maintenance of the O&M,MCR appropriation. Additionally, LMM-3 keeps a program summary for both appropriations which provides a record of how these figures are broken down by program element (PEI, SDR, Mod). [Ref. 15]

D. EXECUTION

1. Operating

During the operating phase of the depot maintenance management cycle, principal end items of equipment and secondary repairables are received into the supply system from active and Reserve units. The units, concurrently, receive serviceable equipment out of the stores system. The equipment they turn in goes into the stores system as unserviceable (unserviceable meaning any condition code other than code A--ready for issue). The ICP monitors and manages this activity and pays close attention to the equipment received at the material division of the MCLB, the levels of unserviceable equipment accumulating in the stores system, and the execution of the master work schedule. The master work schedule will identify, for the ICP, the type and quantity of equipment scheduled to be inducted into the DMA. The ICP will review this schedule quarterly and, by close liaison with the material division of the MCLB and the DMA, will attempt to ensure that the assets are available to be inducted to the DMA and that the DMA is ready to accept them. There is often disparity between what was scheduled to be available for induction to the DMA and the actual availability of unserviceable assets.

Prior to the material division releasing equipment for induction to the DMA, the ICP will identify whether the equipment is a PEI or an SDR and/or whether modification kits will be applied to the equipment. In the case of PEI's and/or modification kits, the ICP will forward a request to LMM-3 which has the legal authority to obligate the funds necessary to perform the work for these program elements. LMM-3 will originate the funding document (project order), citing the specific O&M appropriation information against which to charge work and will cite this against a specific line item number corresponding to the master work schedule. The actual dollar amount funded by LMM-3 will be a function

of the type and quantity of equipment related to the respective line item. In the case of an SDR, the ICP will originate the project order themselves and it will be transacted in the same manner as LMM-3's project order as described above. [Ref. 4]

The project order is under the control of the comptroller division of the MCLB for administration and billing of the order. However, the DMA is responsible for receiving and accepting the project order and for accomplishing the work requirements within the scope of the funding document. The equipment will then be returned to the supply stores system as serviceable equipment ready for issue. [Ref. 2]

2. Measuring

Upon receipt of the project order, the DMA will establish a corresponding job order number (JON) for the accomplishment of the work authorized. Labor standards are then reviewed and shop orders are issued for the accomplishment of the work authorized. The shop order's cost and production are monitored continuously throughout the life of the project order to assure that execution of the job is accomplished within the funding and production commitments established by the project order. As mentioned in the previous chapter, the DMA's automated data collection system is capable of identifying all aspects of labor distribution, material control, cost control and manpower performance analysis to an appropriate JON [Ref. 2].

The key to the DMA's system of matching costs to project orders is the assignment of one JON per one project order corresponding to one line item on the master work schedule (each line item corresponding to specific program elements). The DMA, in this way, is able to identify by program element what type and amounts of resources are being expended (direct labor, materials, overhead), what functions were performed in the process (assembly, fabrication, machining, painting), and what types of equipment the

resources were being expended for (ordnance, motor transport, communications).

3. Reporting

The DMA's automated data collection system identifies all aspects of labor distribution, material control, cost control, and manpower performance as inputs into a central computer's maintenance management subsystem. This subsystem, in turn, generates outputs in the form of reports for five major areas: 1) inventory control, 2) personnel control, 3) payroll, 4) cost management, and 5) performance measurement. The reports are used by the DMA as internal means to analyze and evaluate their overall organizational efficiency, as well as the efficiency of each cost work center within each production control center. The DMA will also generate reports to satisfy the industrial fund payroll. The report of primary interest to LMM-3 and the ICP is the production progress report which exhibits performance in terms of outputs of serviceable equipment.

The production progress report is prepared quarterly and states actual quantities of depot maintenance accomplished and quantities currently in process by equipment type. This report provides the responsible managers at the ICP and LMM-3 with information that they can use to compare the DMA's planned workload (as projected in the master work schedule) with the DMA's actual work accomplished or in process. This allows the responsible managers to stay abreast of current depot maintenance workloads and better manage changes to or problems with the master work schedule. For instance, operating units scheduled to turn in specified equipment for the R&E program do not always turn in the equipment. Also, a significant change in the "threat" may change national strategies and cause a change in rebuild and repair priorities. Subsequently, the supply stores system may end up short of equipment that was scheduled to be processed through the DMA. By being abreast of these

situations, the responsible officers at the DMA and LMM-3 can incorporate timely changes in the master work schedule by altering the scheduled production run size to accommodate the available assets or by altering the order in which equipment was scheduled to be inducted into the DMA.

At the end of the fourth quarter, the production progress reports are reviewed, priced out, and totaled. This dollar total is then reconciled to the dollar total of the accumulated project orders. This is done by program element so that the totals can be reconciled separately with the correct managers. The production progress report is priced out by use of the same cost factors used in computing the funding amounts of the project orders. That is, the cost factor associated with a specific line item number multiplied by the quantity to be inducted (or that has been repaired) is equal to the amount of funding (or reconciliation price). In this way, the reconciliation is between the actual and planned type and quantity of equipment repaired. Additionally, at the end of the fourth quarter, the production progress report will help identify the amount of carry-over work from one fiscal year to the next. By managing the amount of carry-over the DMA will have, the responsible managers can ensure that, when there is a lag between the end of the fiscal year and the approval of a new budget (hence authorization to obligate funds in accordance with a new master work schedule), the DMA will not suffer the consequences of having to shut down production and carry large inventories and unabsorbed overhead.

There are two other reports not mentioned previously that impact on management of depot maintenance. They are generated by the Fleet and Reserve forces.

The equipment status report and controlled items file are periodic reports generated by active and Reserve forces which are used to establish the priority for funding maintenance. The ICP analyzes these reports under the

assumption that this "snapshot" of the status of Marine Corps equipment is representative of any given period of time. This representation of the priority in which equipment needs to be repaired is passed on to be incorporated into the DLMP. The DLMP, as described earlier in Chapter II, is an annual evolution and serves to update the master work plan which is, in turn, periodically reviewed and is reformatted into the master work schedule. The cycle of interaction among these reports is continuous. [Ref. 4]

E. ANALYSIS OF THE PROCESS

The periodic equipment status reports and controlled items files prepared by operational units (both Reserve and active) reflect a high state of equipment readiness. This is evidence that Reserve equipment is being maintained (in terms of depot maintenance) satisfactorily on the same basis as active FMF units' equipment. This also suggests that the Marine Corps depot maintenance efforts are, in total, successful--that the process of planning, programming, budgeting, and execution of depot maintenance is effective for not only the active FMF but also the Reserves. However, this process when compared with the principles of a good management process described in Chapter II, is not an articulated process with regards to the way the Marine Corps Reserve and the active FMF depot maintenance are separated. There are aspects of the methodology for separating Reserve budget figures from active FMF budget figures that prevent the identification of costs to perform depot maintenance specifically with the Reserve forces. The result is that a degree of arbitrariness is introduced into the process of determining the Reserves' "fair share" of depot maintenance.

The planning phase of the process is consistent with good principles in that national strategies identify needs which are analyzed in terms of priorities and resources.

This allows for further analysis in terms of the ability to make current resources available to meet the national strategies and in terms of potential acquisition requirements for equipment.

This process remains consistent with good principles as planning and programming efforts blend together. The information being forwarded to LMM-3 (primarily from the ICP) is the result of the translation of the needs of operational units and the supply stores system to fulfill the national strategies. The information is translated into functional groupings consistent with the ways in which the resources will be used. That is, repair programs like the R&E program will identify PEI and SDR requirements which will indicate priorities of repair for these items, as well as, whether or not the projected demand for servicing these items meets the availability of assets. This provides the basis for projection of new acquisitions and/or the modification program element. These programs are not only aggregated by PEI, SDR, and Mod in conformity to the basic program structure, but they are also time phased in terms of projected outputs of assets to be fed back into the system and ultimately to the operational units. At this point of the process, good management principles would require the information to be compiled into the program structure and costed out into the future years to present a statement, in financial terms, of the Marine Corps' capability to meet it's plans and goals. However, this is the point at which the current methodology breaks down and introduces the arbitrary process which will follow the program throughout the remaining budgeting and execution phases.

When LMM-3 performs it's additional analysis to adjust the Reserve data to fit a historically budgeted pattern, it, in effect, disconnects whatever projections have been made from the programmed and budgeted dollars that will subsequently appear throughout the process. This "smoothing" of

Reserve data to "fit" the past pattern is brought on largely by dealings with the supply system during the execution phase. As described earlier, the supply system is not managed to distinguish Reserve equipment separately from active FMF equipment. It is this aspect of the supply system that prevents program managers at the ICP and LMM-3 from determining what portion of the equipment to be repaired at the DMA will be attributable to the Reserves. To require the supply system to distinguish Reserve related equipment would require extra inputs in terms of labor time needed to collect and process this information, yet would yield no extra benefit in terms of output--the type and quantity of equipment processed through the DMA so as to be ready to support national strategies. Therefore, this breakdown in programming is (in a greater perspective) due to the nature of the supply system.

The remainder of the programming, budgeting, and execution processes is forced to follow this same pattern of treating the Reserve depot maintenance efforts as being encompassed within the total Marine Corps and only separates the two on an arbitrary basis in order to conform to Congressional requirements to have separate accounts. Consequently, the master work plan and master work schedule are total Marine Corps working documents (forecasted and adjusted quarterly) identifying total types and quantities of equipment scheduled to be submitted to the DMA for rebuild, repair, and/or modification. The schedules are completely void of any Reserve specific requirements. Additionally, the Reserve budget breaks down depot maintenance by program element (PEI,SDR, and Mod). However, because the dollar amount is derived incrementally and independent from actual projections , there is no way to correlate the costs to perform depot maintenance to any one of the program elements. Instead, project orders are cut for Reserves based on whether the dollar amount fits the

budgeted capability and whether or not the equipment being inducted to the DMA is "Reserve type" equipment, regardless of whether there is all, part, or no equipment being repaired that is actually attributable to Reserve usage. In this way, program managers can be very flexible in how they fund depot maintenance. This flexibility is necessary because the levels of activity for Reserve depot maintenance can not only fluctuate significantly from year to year but also are subject to changes during the operations of the current year. Flexibility allows program managers to cope with these fluctuations and ensure a total force depot maintenance effort.

The result is that project orders sent to the DMA identify total types and quantities of equipment, and the DMA is, therefore, compelled (by it's automated data collection system) to aggregate and charge costs against one appropriation account per batch of equipment. Therefore, the billings that come back through the system cannot be justified as to whether the money funded for Reserve depot maintenance is being spent for that purpose. What functions were being performed when the work was being charged to the appropriation and what kinds of resources were being used in the performance of the work charged to the Reserve appropriation can be determined. However, there is no way to determine if this represents actual costs to support the Reserves.

Therefore, even though the current process of planning, programming, budgeting and executing depot maintenance is (in terms of total force efforts) justifiable and flexible, it falls short of being a process which can accurately articulate Reserve depot maintenance funds with resources and functions. With regard to the Congressional mandate to manage separate O&M appropriations specific to Reserves, the present system is not in compliance with good management principles, as described in Chapter II of this thesis. Consequently, even though there may be no benefit, in terms

of total force readiness, from changing the current process of programming, budgeting, and executing depot maintenance, there is a potentially larger benefit to be gained in terms of credibility, which could have a significant impact on many Reserve programs in the future.

IV. TWO ALTERNATIVES TO THE PRESENT DEPOT MAINTENANCE PROCESS

It has been determined that the problem with regard to identifying Reserve depot maintenance costs is not in identifying and aggregating costs at the DMA. The DMA is capable of identifying all aspects of costs with specific equipment repair jobs. Costs at the DMA are collected at the lowest levels, cost work centers (CWC); aggregated for every CWC in the repair, rebuild, and/or modification process; and totalled (including the appropriate allocation of overhead) for each job processed through the DMA. The problem, then, with regard to identifying costs to support Reserve depot maintenance is in accurately identifying what equipment is to be attributable to Reserves either before it is inducted into the DMA, so that the DMA can aggregate costs associated with work performed specifically for the Reserves, or after the maintenance cycle at the DMA when the equipment is issued to Reserve units. This identification must be such that the DMA has the basis for a separate JON for Reserve equipment, even though it may be inducted as part of a larger, more economically efficient batch.

This chapter will propose two alternatives to the current depot maintenance process. The first would establish a process whereby the supply system would separately identify Reserve equipment as it is received into the supply stores system from Reserve operating units. A record of it's origin will be maintained and used as a basis for determining what portion of the work performed at the DMA is attributable to Reserves. In this way, what is budgeted for and charged to the Reserve appropriation would reflect actual usage in terms of Reserve generated repair requirements in the supply stores system.

The second alternative would establish a process whereby the supply system need not distinguish between active and Reserve equipment in stores. Instead, the process would measure annual Reserve activity on the basis of actual issues from the supply stores system to Reserve operational units. These data would reflect the type and quantity of both PEI's and SDR's as Reserve related outputs of the depot maintenance process. These data would provide the basis for programming depot maintenance for the Reserves by program element, based on actual usage. Alternative two would also allow for the billing of work performed on an equitable percentage basis. These data would be used to determine what percentage of the total depot maintenance effort of the Marine Corps is attributable to the Reserves. Both alternatives would require changes to the present depot maintenance process and would entail certain common tasks.

A. COMMON IMPACTS OF ALTERNATIVE METHODS

The first task common to the two proposed alternatives is to establish a method whereby the equipment can be identified by LMM-3 to the DMA as separate line items on the master work schedule and thus be assigned separate JON's by the DMA. This can be accomplished by scheduling the workloads for Reserve and active Fleet forces equipment on separate lines of the master work plan and master work schedule. In the case of the first alternative, the Reserve line would be based on the Reserve equipment received into the supply stores system. In the case of the second alternative, the Reserve line would be based on a percent of the total for that equipment type.

Either method will require the additional processing of separate project orders (the second task common to the two alternatives) citing separate O&M appropriations against which to charge the work performed at the DMA. This would result in increased administrative time, materials, and services. The costs associated with the additional

processing would be variable in nature--being directly related to the level of depot maintenance repair activity specifically attributable to the Reserves. This activity has been forecasted for the 1987 and 1988 POM's and is illustrated in table IV .

TABLE IV

NUMBER OF LINE ITEMS OF EQUIPMENT PROJECTED TO BE INDUCTED INTO THE DMA

	Reserve	Total	Reserve % of Total
PEI 1987	17	364	4.7%
1988	15	304	4.9%
SDR 1987	61	1700	3.6%
1988	67	1800	3.7%

Note: One line item of equipment could range from a quantity of 1 to a quantity of 3500 depending on the type of equipment, it's priority of repair and it's availability.

Based on the level of activity projected in table IV and interviews with the Industrial Fund Manager and Budget Analyst from LMM-3, the amount of extra administrative time involved in accomplishing the first task of separating active FMF and Reserve workload requirements on the master work plan and master work schedule is insignificant. It is well within the present capabilities of the salaried work-force and is, therefore, not a relevant cost. Additionally, the cost of supplies, materials, and services to accomplish this task is not relevant because these costs will be incurred during the normal process of reviewing, adjusting and reconciling the master work plan and master work schedule regardless of whether separate line numbers are created for the Reserves workload. Therefore, there is no extra cost incurred to distinguish between the Reserve work-load and the active FMF workload on the master work plan or the master work schedule. There is, however, a benefit from this in that the process would now provide the basis for the DMA to assign separate JON's to the work. Thus it could

aggregate all aspects of costs associated with the work performed for the appropriate source (active or Reserve).

The second task, handling extra project orders, is a direct result of developing separate line items on the master work plan and master work schedule and is consistent with the DMA's accounting procedures. Certain aspects of generating extra project orders will not involve relevant costs for the same reasons stated in the previous section. However, other aspects of the increased handling of project orders are relevant and will show up as increased costs of materials and services corresponding to the extra level of activity generated by Reserve requirements. These costs, although variable with regard to the level of Reserve related activity, will have a fixed nature in that they will be accumulated to the same degree whether the quantity for a particular line item number (hence project order) is one or whether the quantity is 3500. Because of this, the cost to process a project order could be relatively high when compared to the cost to perform the work when a very low quantity of equipment requiring a very small amount of funding is processed. This is very feasible in view of the amounts of Reserve activity reflected in Table IV . LMM-3 estimates that the cost per project order is $50, as described below.

> A project order will be handled by eight different personnel during the course of the maintenance process and will require each person approximately 15 minutes to process it. This equates to 120 minutes or two manhours to process one project order.
>
> The average annual salary of the personnel involved in processing the project order is $27,000 and the standard number of hours worked per year is 2088. This results in an average labor rate of $13 per hour. This labor rate times the two manhours required to process the project order yields a total labor cost of $26 per project order.
>
> A non-labor cost associated with processing a project order derives from charges for message and wire service, as well as costs of miscellaneous supplies (paper, ink, etc.). The aggregated non-labor cost is estimated to be, approximately, $24 per project order and when added to the total labor cost per project order of $26 yields a total cost per project order of $50. [Ref. 15]

However, the derivation of $50 per project order does not take into account that much of the labor involved is performed by a salaried labor force, that the additional workload caused by more project orders can be processed without the need to increase the existing labor force, and that, as a result, this is no relevant cost. Therefore, a more realistic cost per project order can be derived by subtracting the $26 labor cost from the $50 total cost to process one project order to yield a total relevant cost to process one project order of $24.

The end result of the cost impacts common to the two proposed alternatives is that, while there is no significant cost to separate Reserve and active FMF projected workloads on the master work plan and master work schedule, there is a relevant cost of $24 per project order for material and services. This cost, which occurs as a result of the Reserve specific depot maintenance activity, would show up as increased operational costs within various offices of the ICP; the Comptroller at MCLB, Albany; LMM-3; and Fiscal Division, HQMC. At the level of activity projected in Table IV for 1988, this cost would equate to about $1,968 annually as shown in Table V .

TABLE V

TOTAL ANNUAL COST OF INCREASED WORKLOAD

SDR	67 * $24	=	$1,608
PEI	15 * $24	=	$360
			$1,968

B. ALTERNATIVE ONE

The planning phase for this alternative would require no change to the current process. However, the DLMP would play a greater role as the key document which states, in terms of time phased requirements, the Marine Corps' depot

maintenance plan to meet national objectives and goals. Information from the DLMP would be used to develop a program, in financial terms, reflecting the capability to carry out this plan. This alternative would require LMM-3, during the programming phase, to use the projections of Reserve activity provided in the DLMP not only in the POM submission but also in developing the workloads reflected in the master work plan and the master work schedule. The budget would, consequently, flow out of the programming phase by incorporating the costed-out data that the DMA provides from the master work schedule into a budget format. This would make the budget consistent with the way in which equipment would be identified as a Reserve generated requirement, scheduled for induction at the DMA, and, subsequently, billed to the Reserve appropriation. In doing so,the incremental smoothing and the arbitrariness would be eliminated from the current process of managing depot maintenance. This would make alternative one precise in terms of accounting practices, as well as credible in terms of justifying to the Fiscal Division at HQMC and ultimately to Congress that what is budgeted for Reserve depot maintenance would be actually spent in that regard. However, there would also be a potential disadvantage to this alternative.

The funding amounts for Reserve depot maintenance would reflect what requirements should materialize during the fiscal year based on the DLMP. Programmed requirements are independent from what is actually turned in from operational units. Actual turn-ins are a function of the realities that units often defer turning in equipment that is serviceable and, conversely, units will need to turn in equipment that is unserviceable whether it is programmed to be turned in or not [Ref. 4]. For example, a very common situation would be where the Reserves were scheduled to turn in "x" amount of PEI's and SDR's for depot repair during the course of the fiscal year, but they actually turned in an amount, "x+y".

The "y" amount of Reserve generated depot maintenance requirements would not be funded in the depot maintenance portion of the O&M,MCR appropriation. Consequently, a transfer of funds from the O&M,MC appropriation to the O&M,MCR appropriation would have to be approved or else the extra "y" amount of requirements would go unfunded and be carried over to the next fiscal year's workload. The opposite situation could also occur, where less equipment would be turned in than was programmed and the extra dollars in the depot maintenance portion of the O&M,MCR appropriation would need to be used in support of the FMF depot maintenance efforts. In either case, the inflexibility of this alternative to cope with variances between planned and actual activity and the consequent need to transfer funds between O&M appropriations could lead Congress to interpret such transfers as a reflection of improper budgeting practices. This situation would be aggravated when viewed in concert with the irregular year-to-year funding patterns that would be characteristic of this alternative.

The basic feature of this alternative is to identify the equipment that is received into the supply system as to whether it is a Reserve generated requirement to repair. This involves identifying (as to quantity and type) the equipment in the supply stores system as to whether it was received from the Reserve or Active forces. This information would need to be recorded and managed to provide a justifiable basis for scheduling and billing the work performed on this equipment by the DMA. To establish this identification process requires no changes to the supply system's information system. The necessary information needed to identify and monitor Reserve generated equipment is already being recorded. The change to the current process of managing depot maintenance would require the inventory managers at the ICP to call-up the document control file portion of the master information file or, for

serialized items (i.e., small arms and radios), the controlled items file. These files contain information reflecting the status of the equipment in the supply stores system. This information is controlled by the use of document numbers for each type of equipment, and part of the make-up of this document number is a unit identification code (UIC) or a reporting unit code (RUC). These codes link a piece of equipment to the originator of the document--an operational unit. In this way Reserve equipment can be identified and monitored until it is inducted into the DMA for depot maintenance. In doing this, separate project orders can be provided to the DMA (from LMM-3 for PEI's and from the ICP for SDR's) on the basis of actual Reserve generated requirements. For example, if ten unserviceable trucks within the supply stores system were scheduled to be sent to the DMA for repair and three of them were received from Reserve units, then the total batch of ten trucks would be inducted into the DMA on two separate project orders--one for seven trucks citing the O&M,MC appropriation and one for three trucks citing the O&M,MCR appropriation. As stated earlier, it is expected that the numbers of actual Reserve requirements that materialize out of the supply stores system would not always match the number planned for on the DLMP and master work schedule. This disparity would be reconciled quarterly and the schedules would be adjusted as is done presently for total Marine Corps requirements. This process of comparing actual activity to planned activity and adjusting the outyears to accommodate the differences lays the framework for future programming and budgeting. In this way, programs and budgets can be projected by program element and reconciled to actual levels of activity attributable to Reserve and active FMF units.

The costs inherent in this alternative (in addition to the $24 cost common to both alternatives for handling additional project orders) are in terms of extra inputs of

labor required to distinguish Reserve equipment from active FMF equipment. Since there are no system change costs associated with this alternative, managing the available data is the key factor. Interviews with the program manager at the ICP, MCLB, Albany determined that the person responsible for managing the data would be a GS-11. It would take that person 15 minutes twice a month to call-up the necessary files and screen, record, and format information as to the type and quantity of equipment received at the material division at the MCLB from Reserve units. Once the information is recorded and formatted, it would be compiled and passed to the schedulers at the ICP. This part of the process falls within the scope of normal current operations in the management of total Marine Corps assets and, as a result, would be done regardless of whether Reserve and Active forces were processed as separate requirements. However, the time required by the schedulers at the ICP to record, validate and list as a requirement by scheduling Reserve specific equipment would be a function of the amount of Reserve equipment involved. Table IV indicates that the general activity for PEI's and SDR's combined would be about seven per month. Again, interviews with the program manager at the ICP, MCLB, Albany determined that it would take a scheduler approximately five minutes per request to handle this extra workload or about 35 minutes per month

The total amount of extra time required for salaried personnel to accomplish this alternative is 65 minutes over the course of a month (30 minutes for recording and monitoring by the inventory managers and 35 minutes for the schedulers) Again, as in the case of the development of separate line items on the master work schedule and master work plan, there is enough excess capacity in the present salaried workforce to handle the amount of time needed to accomplish these Reserve related tasks. Therefore, labor is not a relevant cost and the total cost to incorporate and

accomplish this alternative is the cost common to both alternatives of $24 per project order for handling extra Reserve specific funding documents.

C. ALTERNATIVE TWO

The second alternative of identifying the destination of equipment as it comes out of the supply stores system instead of recording and tracking Reserve equipment coming into the supply stores system would allow the depot maintenance process to be managed in accordance with the "one Marine Corps" concept for which the supply system is designed. Reserve equipment would not have to be tracked through the supply stores system as separate depot maintenance requirements.

The preparation of the DLMP would again be central to the planning phase at the ICP, in that it is the DLMP that translates national strategies and objectives into quantitative rebuild, repair, and/or modification requirements from which data would be developed for inclusion in the POM. In this alternative, however, the DLMP needs only to focus on total Marine Corps requirements--from which total program figures would be developed. Concurrent with the development of the DLMP at the end of the fiscal year, the Comptroller's records would need to be reviewed in order to determine the type and quantity of SDR's and PEI's that were issued to the Reserves during that fiscal year. These data would be used to build a historical file from which trends could be analyzed by program element for expected future levels of activity. Simple averaging , exponential smoothing, and linear regresssion are possible methods of accomplishing this task. These two documents together (the DLMP and the historical data file) would provide the basic information for LMM-3 to develop the POM submission. The programming process for this alternative would be performed by compiling the projected quantities and types of equipment for Reserve depot maintenance by PEI and SDR, time phasing them for the

outyears, and costing them out--much in the same way as it is done now.

The difference between the current process and alternative two is that currently the workload figures derived at this point in the process are "smoothed" to fit dollar amounts corresponding to a predetermined level of funding. The difference, then, between what was projected for Reserve depot maintenance and the predetermined dollar amount is merely added to or deducted from the amount otherwise programmed for the depot maintenance portion of the O&M,MC appropriation. This aspect of the current process is what leads to it's failure to justify what was programmed, budgeted, and executed for Reserve depot maintenance and thus, prevents reconciling what is spent for Marine Corps Reserve depot maintenance to any measure of Reserve activity. The figures derived in accordance with alternative two would not cause the same failure at this point. Although the figures would still be "smoothed", they would then be derived from actual activity (outputs received by Reserves) and could be supported by the historical file. These figures would represent the Reserves' actual share of depot maintenance as a yearly average, which would be programmed for the POM year and the outyears.

In developing the master work plan and master work schedule, it would only be necessary to program the total Marine Corps requirements. However, the schedule's format would be designed such that line numbers would be able to be identified for the Reserves. A percentage of the total of any given line item could be funded by the Reserve appropriation. The budgeting phase for this alternative would be an extension of the programming efforts, in that the budget would project, by program element (PEI,SDR, or Mod), the same level of activity for the Reserves as stated in the POM. Just like the current process, the dollar figure would then be derived from the current DMA prices, derived from

the priced out master work schedule that the DMA prepares for LMM-3. However, when the budget is formatted, this alternative would require LMM-3 to determine what percentage the Reserve depot maintenance figure is of the total Marine Corps depot maintenance figure. By doing this, when a batch of equipment is scheduled to go to the DMA for repair, two project orders could be originated from the corresponding line number of the master work schedule (for example, line number 1 and 1R) and funded in accordance with the percentage share between the active FMF O&M,MC appropriation and the Reserve O&M,MCR appropriation. This would allow for the same degree of flexibility as is currently used to ensure that all depot maintenance is funded regardless of variations in actual and planned requirements. Additionally, by funding work performed at the DMA on a percentage basis, this alternative allows the DMA to aggregate cost by program element and charge them to the appropriate appropriation. This links what is being charged to the Reserve appropriation to a measure of actual activity, as evidenced by a historical file identifying outputs the Reserves have received as a result of the depot maintenance cycle. Although not as precise as alternative one in terms of justifiable levels of activity, alternative two would provide evidence which justifies that what would be budgeted for depot maintenance of Reserve equipment would be spent for that purpose. This matching of budgeted and actual spending might not occur precisely in each fiscal year, but it would do so over a period of many years.

Again, interviews with the program manager at MCLB, Albany indicated that the labor cost to perform this alternative (like alternative one) would not be a relevant cost. The interview determined that it would take a GS-11 only 12 hours annually to gather the data necessary to build a historical file. Additionally, the time spent in the analysis of this data for programming and budgeting purposes

would be no greater for this alternative than in the current process. This is because this type of analysis is an on-going part of the management of the total Marine Corps depot maintenance effort, anyway. Therefore, since there is no additional relevant cost of changing to alternative two in terms of time spent in the analysis of the data, the result would be just like alternative one. The only relevant cost of alternative two is the cost of $24 per project order to handle the Reserve specific funding documents.

V. CONCLUSIONS AND RECOMMENDATIONS

In the final analysis, the practicality of identifying Marine Corps Reserve depot maintenance costs rests on determining to what extent the costs of doing so are worth the benefits gained. The incremental costs (cf. Table V) are clearly modest, if not negligible. The benefits to be gained are in terms of two separate and equally difficult to quantify conditions--force equipment readiness and credibility. Under the current methodology of managing Reserve depot maintenance, the Reserves are reportedly "healthy" with regard to the state of equipment readiness and are being supported in terms of depot maintenance in accordance with national priorities. This research has found no reason to believe that either alternative one or alternative two would prove to be any more beneficial in this regard, because neither proposed alternative would improve the efficiency of the system in terms of serviceable equipment available to be issued to operational units or strategic mobility enhancement programs. Therefore, no change can be justified on grounds of improved force equipment readiness.

However, there are benefits to be gained by changing to either alternative one or alternative two in terms of the ability to relate the work programmed for rebuild, repair, and/or modification of Reserve equipment to actual levels of activity. Additionally, either alternative would provide the ability to reconcile what has been budgeted for depot maintenance for the Reserves with what has been spent to accomplish the work. These benefits cannot be measured in terms of dollars or readiness but, instead, represent credibility which can be gained (or not lost). In managing the depot maintenance for the Marine Corps (as in managing any appropriation account), it is vital that the program managers provide information that is worthy of belief by the

higher authorities who have control over allocating funds for programs (Congress) and by those who are responsible for recording these transactions (Fiscal Division, HQMC). Therefore, in a cost-benefit analysis of changing from the current process of managing depot maintenance to alternative one or alternative two, credibility becomes the essential benefit.

Credibility is not a short run phenomenon. It is a characteristic built with time and has long term consequences. Thus, in addition to influencing future levels of Reserve funding (including not only depot maintenance but also all aspects of FDYP program 5), the value placed on credibility, regardless of the size or nature of a program, is a statement about the Marine Corps organizational values.

The current process of managing depot maintenance is characterized by being flexible with regard to funding work performed at the DMA. However, it is based on an arbitrary budgeting process which has no link to any measure of actual Reserve activity. It is not a justifiable process and has been the source of many unanswered questions by the Fiscal Division, HQMC relative to whether the money spent for Reserve depot maintenance was really used in that regard. The current process lacks credibility. Both alternatives one and two would provide the credibility needed to execute a justifiable depot maintenance process of planning, programming and budgeting. The cost associated with adopting alternative one or alternative two has been determined in the previous chapter to be variable in nature at $24 per project order. Based on a level of activity as typified by Table V, the annual cost to change from the current process to either alternative would be approximately $1,968. This amount, when contrasted to the amounts budgeted for depot maintenance in Tables II and III from Chapter II of this thesis, is hardly significant. The cost of $1,968 annually is worth having a system of planning,

programming, budgeting, and execution for Reserve depot maintenance that is articulated, reconcilable, and, in general, credible. Therefore, the identification of Reserve depot maintenance costs is not merely feasible but also necessary. What remains to be established, then, is which alternative (one or two) is most beneficial in terms of it's impacts on the overall management of the depot maintenance process.

Alternative one, although more precise in terms of accounting practices than alternative two, is less flexible in terms of managing variations between planned and actual requirements. This makes the programming process more difficult and makes the execution phase subject to transferring funds in order to adjust to fluctuating levels of depot maintenance or subject to carrying over Reserve depot maintenance requirements from one fiscal year to the next because of the lack of funds in the depot maintenance portion of the O&M,MCR appropriation. This type of shuffling of funds could cause Congress to interpret it as a reflection of improper budgeting practices. This would subject budget submission to closer Congressional scrutiny and possible cuts in the Marine Corps Reserve budget in an effort by Congress to stabilize the fluctuating budget figure.

Alternative two's measure of the level of activity does not fluctuate from year to year for budget purposes because it would be a trend prediction based on averaging, exponential smoothing, or regression, which would produce a more stable budget figure year after year. By funding each line number of the master work schedule in accordance with the Reserve's percentage of the total Marine Corps depot maintenance effort, alternative two not only ensures that all depot maintenance would be accomplished and funded on a actual "fair share" basis without the need to transfer dollars between appropriations but would also provide the

flexibility necessary to manage an account the size of the Reserve depot maintenance account, which cannot handle large fluctuations between planned and actual requirements on an annual basis. Additionally, alternative two provides a justifiable degree of precision by relating what is budgeted and spent to an actual historical measure of Reserve activity.

The cost to change from the current process of managing the Reserve depot maintenance funds to either alternative one or two would entail the same basic cost of $24 per project order, or about $1,968 for a typical year. The final tradeoff between the two alternatives, then, is between the precision gained in terms of program and budget justification versus the flexibility of the process to be executable in such a way that variations to the schedule will not jeopardize the overall Marine Corps maintenance effort. The depot maintenance process is subject to the realities of the changing needs of the operational units and, as such, will always be characterized by variances between planned activity and actual activity. Because of these operational realities, there is no additional benefit to being more precise in identifying and projecting actual Marine Corps Reserve requirements for depot maintenance. However, there is a need for the method of managing the depot maintenance process to be justifiable in the sense that it can be related to an actual measure of Reserve activity. Alternative two provides this. Moreover, alternative two provides the flexibility needed to ensure that Marine Corps Reserve equipment will be maintained regardless of fluctuating levels of activity. Therefore, it is submitted that a change to the current process of managing depot maintenance for the Reserve forces would provide a net benefit to the Marine Corps. It is, additionally, recommended that the method to effect a change should be the process described in alternative two.

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